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The role of insurance risk transfer in encouraging climate investment in developing countries

SWENJA SURMINSKI

INTRODUCTION

Environmental change has profound effects on economies, wider society, individuals and ecosystems. Responding to threats such as pollution, loss of biodiversity or climatic changes requires public policy intervention, as well as private action and significant new capital investments. Under the caption of 'sustainable development' more and more private companies and national governments pledge to balance the economic, social and environmental effects of growth. Innovative solutions are being developed and tested, especially in the context of financing the required action. One particular area that receives increasing attention is how best to foster public and private investments in environmental protection. This is especially relevant for low-income countries: often those most exposed to environmental changes are least capable to respond to the threats, and require financial and technical support from developed countries and donors. Most commentators have focused on the role of public policy in facilitating the required environmental investments.[1] Conversely, the application of financial instruments such as insurance is still under-researched.

The author wishes to thank Andrew Williamson and Delioma Oramas-Dorta for their input and helpful comments.

[1] See D. Fiorino, *The New Environmental Regulation* (London: MIT Press, 2006); E. Somanathan and T. Sterner, 'Environmental Policy Instruments and Institutions in Developing Countries', in R. López and M. Toman (eds.), *Economic Development and Environmental Sustainability: New Policy Option* (Oxford University Press, 2006), chap. 7; F. Foxon and P. Pearson, 'Overcoming Barriers to Innovation and Diffusion of Cleaner Technologies: Some Features of a Sustainable Innovation Policy Regime' (2008) 16 *Journal of Cleaner Production* 148; S. Fankhauser, 'A Practitioner's Guide to a Low-Carbon Economy: Lessons from the UK', Policy paper, Centre for Climate Change Economics and Policy, 2012, available at www.cccep.ac.uk (accessed 24 January 2012).

Insurance risk transfer has been used for centuries as a tool to manage the risk of uncertain losses. In its most basic form insurance is a mechanism where risks or part of a risk are transferred from one party (the insured) to another party (the insurer) in return for a payment (the premium). The insurer pays out a previously agreed amount if the insured experiences a loss, or if a predefined event occurs.[2] In other words, the insured pays a certain premium to reduce the risk of an uncertain loss. This reduction in uncertainty is widely seen as an important mechanism driving our economic systems: without insurance many activities and processes would be deemed too risky and would not be undertaken. Moreover, in the event of a loss, those affected might struggle to recover. In economic terms the justification for any insurance is derived from the welfare function, which means that the provision of insurance can increase the expected utility of individuals, companies or society.

At first sight insurance seems an unusual choice for supporting environmental protection: the inherent problem of moral hazard can mean, in an environmental context, that the provision of an insurance policy triggers risky and unwanted polluting activities on the side of the insured. But safeguards can be designed in order to avoid moral hazard and incentivise risk reduction by the policyholder. An example is environmental-liability insurance, where the insured is often required to assess and improve standards and procedures that could lead to pollution. This creates an incentive for those companies seeking insurance to comply or exceed environmental standards as the policy will only pay out if the insured is compliant. In addition to this indirect risk-reduction role derived from the compensation function of insurance, there is another dimension of the environmental role of risk transfer: insurance can make investments less risky and therefore foster innovation and the development of cleaner technologies.

Most of the existing analytical work exploring the environmental role of risk transfer has focused on two risk areas: pollution liability and natural disaster insurance, which can both have catastrophic consequences. A 2003 OECD study finds that, with pollution insurance, the insurer may act as a private surrogate regulator aligning its interests with

[2] N. Ranger, S. Surminski and N. Silver, 'Open Questions about How to Address "Loss and Damage" from Climate Change in the Most Vulnerable Countries: A Response to the Cancún Adaptation Framework', Policy paper, Centre for Climate Change Economics and Policy, 2011, p. 9, available at www.cccep.ac.uk (accessed 15 March 2012).

those of high environmental standards.[3] The internalisation of environmental costs through the payment of premiums is compatible with the deterrence goal of any liability regime and with the polluter-pays principle. Conversely, Minoli and Bell[4] find in an evaluation of two leading UK insurance companies' pollution claims that the insurers' initial underwriting assessments and post-loss investigations are insufficiently developed. Similarly, the management practices of insured parties in connection with the prevention of pollution are also underdeveloped. Consequently, insurers' terms and conditions on policies are insufficient to work as an incentive to dissuade pollution losses. The effectiveness of environmental insurance has been extensively researched for the USA. Some studies show indeed that despite a range of practical barriers environmental insurance can achieve efficiency where government fines do not.[5] In the context of natural disaster, the main analytical focus has been on the potential for insurance risk transfer to be coupled with incentives (such as building standards and codes) and other regulatory instruments to reduce potential losses from natural disasters. Surminski[6] finds that there is evidence of insurers engaging in disaster risk reduction by raising awareness, promoting and supporting the risk-reduction activities of their clients, but measuring the effectiveness of these efforts remains a challenge.

While most of the literature has explored pollution liability and natural disaster insurance in the context of developed markets, there is now a growing focus on emerging markets and developing countries. Here the situation is characterised by low insurance penetration and growing risks. Freeman and Kunreuther[7] describe the challenges faced by developing countries when utilising insurance products for risk management.

[3] OECD, *Environmental Risks and Insurance: A Comparative Analysis of the Role of Insurance in the Management of Environment-Related Risks*, Policy Issues in Insurance, No. 6 (Paris: OECD Publishing, 2003), available at www.oecd-ilibrary.org (accessed 15 January 2012).

[4] See D. M. Minoli and J. N. B. Bell, 'Insurance as an Alternative Environmental Regulator: Findings from a Retrospective Pollution Claims Survey' (2003) 12 *Business Strategy and the Environment* 107.

[5] See H. Yin, A. Pfaff and H. Kunreuther, 'Can Environmental Insurance Succeed Where Other Strategies Fail? The Case of Underground Storage Tanks' (2011) 31 *Risk Analysis* 12.

[6] S. Surminski, 'Adapting to the Extreme Weather Impacts of Climate Change – How Can the Insurance Industry Help?', *ClimateWise*, November 2010, available at www.climatewise.org.uk (accessed 12 March 2012).

[7] P. K. Freeman and H. Kunreuther, *Managing Environmental Risk Through Insurance* (Boston, Mass.: Kluwer Academic Publishers, 1997), 159–89.

Pollution insurance or natural catastrophe risk insurance requires a sophisticated set of laws, regulations and administrative agencies. A 2012 report by Swiss Re, a large reinsurer, on the evolution of pollution insurance in China, notes that, while the potential for pollution insurance remains sizeable in China, several challenges remain.[8] These include the need for a developed legal framework, the current small market base for pollution insurance, firms' lack of in-house knowledge and client awareness and an absence of historical loss data. The existence of an appropriate legal framework seems particularly important. Warner and others[9] find that community risk awareness, dissemination of risk information and financial literacy are particularly important for disaster insurance schemes in developing countries.

In this context, the present chapter explores the potential of insurance instruments to tackle one major environmental challenge, namely climate change. It is well documented that the greatest threats from climate change are expected in those parts of the world that are most vulnerable. Assisting those countries in their efforts to become more resilient to climate risks is now a key part of the international climate negotiations under the UNFCCC.[10] Agreeing a suitable Adaptation Framework will require significant funds – and there are growing expectations amongst policymakers that this will be met to a large extent by the private sector. At the same time it is evident that any significant reduction in global emissions over the next decades will have to involve those countries with the highest current growth rate. Fostering low-carbon growth in developing countries is therefore a key goal of global climate policy. Financing this transition to 'greener' economies will require large investments, both publicly and privately.

Generally speaking, any investment carries risks and opportunities. Investments will only be made if the rate of return is high enough to justify the risks involved. In the context of climate mitigation and adaptation in developing countries the risks are often perceived to be particularly high (in some cases too high) to encourage private investment, with projects not meeting the required 'investment grade' status

[8] Swiss Re, 'Environmental Pollution Liability Insurance in China: A Bumpy Road Leading to a Bright Prospect' (2012). Available at www.swissre.com (accessed 11 March 2012).

[9] K. Warner, N. Ranger, S. Surminski et al., 'Adaptation to Climate Change: Linking Disaster Risk Reduction and Insurance', paper prepared for the United Nations International Strategy on Disaster Reduction (Geneva: UNISDR, 2009), available at www.preventionweb.net (accessed 14 March 2012).

[10] United Nations Framework Convention on Climate Change, 9 May 1992, 31 ILM 849.

required by many investors. This chapter explores if and how insurance risk-transfer schemes could encourage investment in climate-related projects in developing countries. The analysis focuses on the compensation, risk-reduction and supporting environmental investment functions of insurance schemes.[11]

After a brief discussion of the potential role of insurance in environmental protection in developing countries (9.1.), the chapter analyses the particular case of insurance of climate-change-related investment in developing countries, in the context of both mitigation and adaptation (9.2.). The chapter concludes with a summary and an outlook on future perspectives (9.3).

9.1 Financial instruments and environmental protection in developing countries: the role of insurance

Insurance is a widely used financial product in most developed countries, although availability, demand and scope vary significantly from country to country owing to local customs and traditions, different risk attitudes and regulation. Insurance can come in different forms and shapes: (i) it can be provided by public or private entities;[12] (ii) the insured might seek cover on a voluntary basis or it can be compulsory; (iii) it can cover individuals, businesses, insurers/reinsurers (via reinsurance), organisations or governments; (iv) it can cover different types of hazards (e.g., flood or illness) and exposures (homes, motor cars or business

[11] Insurance encompasses two kinds of activities: providing insurance risk transfer (liability side) and investing insurance funds (asset side). The liability side of insurance can be classified into different categories: life insurance, non-life insurance, reinsurance (insurance of insurers) and alternative risk transfers. The asset side of insurance is concerned with investing the funds accumulated and managing the capital base of an insurer. As institutional investors, insurers can influence capital flows across asset classes and markets. But this chapter only considers the liability side of insurance. Obviously there is an environmental role to play for insurers as institutional investors, just like for any other investors. But an assessment of this investment role is beyond the scope of the chapter.

[12] In general terms, insurance can be provided by the private sector or 'publicly' through governments and governmental agencies. Within this spectrum, variation exists and some large-scale risks, such as terrorism or natural catastrophe, are covered through public–private partnerships, where the private insurance industry and government share risks. Private companies can be domestic or foreign, and the cover can be provided directly or via reinsurers, who mainly operate at a global scale. Insurance companies can also take the form of mutuals, which are owned by the insured, and function like cooperatives.

interruption) and have different coverage designs (varying levels of cover, features such as deductibles, exclusions, conditions); (v) and the cover provided can be loss-based (a loss must be evident) or parametric (triggered by a certain event).

The provision of risk transfer is still in its infancy in most developing countries, as shown by the distribution of insurance premiums. In 2010, Europe (37 per cent) and North America (30 per cent) were the largest insurance markets in terms of premium volume. Asia accounted for 27 per cent of the global premium volume. In contrast, Latin America and Africa/Oceania only made up a 6 per cent share of the global insurance premiums (3 per cent each).[13] Most developing countries experience very low insurance penetration rates.[14] Insurance penetration shows the relationship between economic growth (GDP or GDP per capita) and insurance premiums, and it is an indicator of how active and developed the insurance sector is within a country.[15] Plotting penetration levels against per capita income for different countries produces the so-called Global Trend Line (Munich Re) or 'S-curve' (Swiss Re). This relationship suggests an income elasticity of insurance premiums, which typically varies with the stage of economic development: with growing income insurance penetration increases, after a certain level of GDP per capita is reached it tends to plateau.[16]

Mainly due to the growth of emerging economies, insurance activities are now spreading more widely across the globe (Figure 9.1). A range of studies have underlined the importance of stable and effective institutions for a functioning insurance market, such as law enforcement, but also the availability of risk data.[17] Education and financial literacy levels are also perceived to be driving factors for the development of

[13] See CEA, *European Insurance – Key Facts* (Brussels, 2011), 4, available at www.insuranceeurope.eu (accessed 21 January 2012).

[14] See H. Ibarra and J. Skees, 'Innovation in Risk Transfer for Natural Hazards Impacting Agriculture' (2007) 7 *Environmental Hazards* 62.

[15] See S. Hussels, D. Ward and R. Zurbruegg, 'Stimulating the Demand for Insurance' (2005) 8 *Risk Management and Insurance Review* 257.

[16] Data provided by Munich Re. See also N. Ranger and S. Surminski, 'A Preliminary Assessment of the Impact of Climate Change on Non-Life Insurance Demand in the BRICS Economies', Working Paper 72, Centre for Climate Change Economics and Policy (2011), available at www.cccep.ac.uk (accessed 17 January 2012).

[17] See L. Brainard, 'What is the Role of Insurance in Economic Development?', Zurich Government and Industry Thought Leadership Series (2008), No. 2; Hussels, Ward and Zurbruegg, 'Stimulating the Demand for Insurance'.

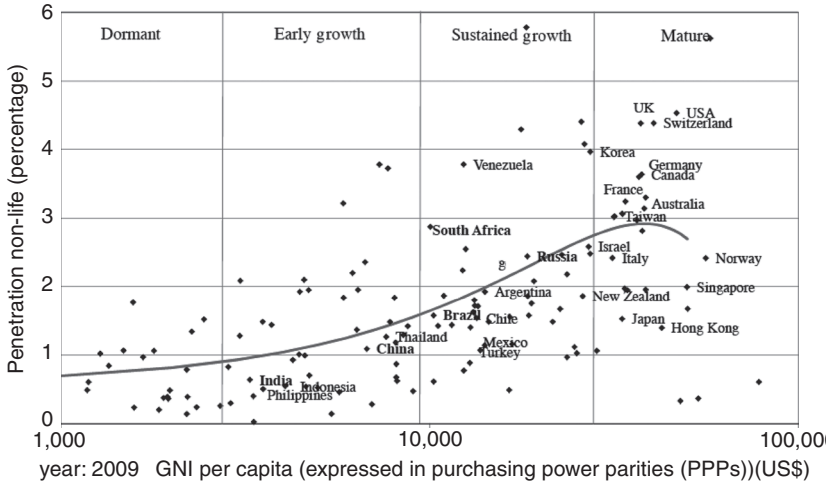

Figure 9.1 *Relationship between gross national income (GNI) per capita (expressed in purchasing power parities (PPPs)) and the penetration of non-life insurance (percentage of GDP) in 2009 for 200 countries*

Notes: The grey line is the 'global trend line'. The vertical lines indicate approximate phases of market development.

Source: Data provided by Munich Re. N. Ranger and S. Surminski, 'A Preliminary Assessment of the Impact of Climate Change on Non-Life Insurance Demand in the BRICS Economies', Working Paper 72, Centre for Climate Change Economics and Policy (2011), 9. Available at www.cccep.ac.uk (accessed 17 January 2012).

insurance.[18] In addition, the specific characteristics of a market, such as distribution channels and appetite for innovation in terms of products and services can drive or hold back the development of insurance.[19] The last decade has seen several efforts to liberalise the insurance industry. Despite some local differences, there is indeed a trend towards the opening up of national markets (such as in China and India) to foreign companies, international trade liberalisation and harmonisation of the EU insurance market.

The insurance products available in developing countries reflect the scope of coverage available in more established insurance markets,

[18] See P. Masci, L. Tejerina and I. Webb, 'Insurance Market Development in Latin America and the Caribbean', Inter-American Development Bank Sustainable Development Department Technical Papers Series, IFM-146, 2007.

[19] See UNCTAD, *Trade and Development Aspects of Insurance Services and Regulatory Frameworks, 2007*, available at www.unctad.org (accessed 11 March 2012).

including life and non-life (such as health, motor, property, crop, funeral, commercial) risks. Government schemes are also in operation, mainly in the social insurance context and for certain catastrophe types, backed by global reinsurance and/or international donors. Specifically designed for developing countries are microinsurance and some new forms of parametric insurance, mainly used in the agricultural sector. Despite recent growth trends, both private and public insurance schemes still face a lot of challenges in developing countries, such as lack of capital by domestic players or governments due to weak finance sectors and limited access to global markets.

The main role of insurance is the transfer of risks and the provision of compensation in the event of a loss. Well-designed[20] insurance initiatives and markets can play a wider economic and social role by:

1. promoting financial stability and security at both the national and personal levels;
2. encouraging productive investments and innovation through the mitigation of the consequences of financial misfortune;
3. mobilising savings;
4. contributing to an efficient use of capital based on insurers' role as significant institutional investors;
5. facilitating firms' access to capital (as institutional investors);
6. reducing the capital firms' need to operate;
7. promoting sensible risk management through the price mechanism; and,
8. fostering stable consumption throughout the customer's life.[21]

Insurance can also play a social welfare role, taking over some public relief functions and being used as a tool for public policy, for example, in the context of social security.

Some of the factors from the list above hint at a potential role for insurance in environmental protection. Item (1) can be seen in the context of providing compensation for victims, for example, in the case of accidental pollution. Item (2) is about reducing the financial risk of a

[20] By contrast, badly designed insurance products and badly structured insurance markets can lead to moral hazard, maladaptation to future risks and to inefficiency.

[21] See Geneva Association, *Global Insurance Industry Factsheet* (2010), 4, available at www.genevaassociation.org (accessed 15 February 2011).

Table 9.1 Links among types of insurance, function and applications

Type of insurance	Risks covered	Environmental applications
Liability	Accidental pollution, directors and officers	Compensation of victims, funding of clean-up, fostering risk reduction = no. 1 + no. 7 of the insurance functions
Project insurance	Construction risks delivery failure, property damage, political risk, business interruption	Facilitating 'environmental' investment and supporting technological innovation by transferring risks = no. 2 of the insurance functions
Natural disaster	Property damage, business interruption	Compensation for damages, funding of recovery efforts, fostering risk-reduction = no. 1 + no. 7 of the insurance functions
Policy risks	Change in subsidies	Facilitating 'environmental' investment and supporting technological innovation by transferring risks = no. 2 of the insurance functions

particular activity, for example, for investors in new 'green' technologies. Item (7) touches on incentivising risk management, for example, by charging higher insurance premiums for those activities that might harm the environment. Table 9.1 provides an overview of different types of insurance and links them to the broad functions of insurance listed above, as well as with their more specific environmental applications.[22]

[22] In addition to these four categories there is a much broader range of environmental applications which are not considered in this analysis. They are often captured by the heading 'green products'. These are often adaptations of existing products, such as motor insurance, which are designed with a link to environmental aspects, such as pay-as-you-drive motor insurance policies that have been promoted as 'policies to reduce private usage of cars', and policies that achieve greater energy efficiency, such as 'eco homes' policies. A good overview is provided in E. Mills, *From Risk to Opportunity: Insurer Responses to Climate Change* (Boston, Mass.: Ceres, 2009).

Particularly the risk-reduction element (7) in the above framework is linked to the issue of moral hazard: pollution insurance and also natural disaster cover could be seen as a licence to pollute or a licence to build and operate in a way that is unnecessarily harmful to the environment, unless a direct link between the environmental efforts of the insured and the level of the premium is established. Here, insurance, if designed properly, can offer an incentive for prevention and risk reduction, for example, by imposing certain operational standards, which reduce pollution risks.

The application of these insurance instruments has been predominantly focused on developed countries and established insurance markets. Estimating the market size remains difficult. For natural catastrophe (or 'nat cat') insurance there is evidence of an insurance gap. Estimates indicate that in developing countries only 3 per cent of natural disaster losses are insured compared to 40 per cent in developed markets.[23] For pollution insurance anecdotal evidence suggests a global market size of around US$3 billion, which is heavily dominated by the US market.[24] For the size and spread of nat cat insurance the most commonly used indicator is insured loss, with a global figure of US$38 billion stated for 2010,[25] again heavily dominated by the US market and other developed countries. Only recently have there been increased efforts to provide risk transfer in a low-income country context. Guoqiang and Jinyan[26] analyse the progress of environmental insurance in China. In the municipalities Dalian, Changchuan, Shenyang and Jilin, pollution insurance was initially developed in the 1990s as a collaborative effort between the local environmental protection departments and insurance companies. The authors state that the initial development of pollution insurance was unsuccessful and that, in 2007, the State Environmental Protection

[23] K. Warner and A. Spiegel, 'Climate Change and Emerging Markets: The Role of the Insurance Industry in Climate Risk Management', in Geneva Association, *The Insurance Industry and Climate Change – Contribution to the Global Debate* (Geneva: Geneva Association, 2009), 83–96.

[24] Based on interviews with market players by the author in February 2012.

[25] Munich Re NatCat Service, 2011: Natural Catastrophes Worldwide 2010, available at www.munichre.com (accessed 13 Februrary 2011).

[26] R. Guoqiang and S. Jinyan, 'The Conditions of China's Environmental Liability Insurance System: Bioinformatics and Biomedical Engineering (iCBBE)', paper presented at the 2010 4th International Conference, available at http://ieeexplore.ieee.org (accessed 15 February 2011).

Department provided a framework to establish an environmental pollution liability insurance system that would serve gradually to expand pollution insurance coverage nationwide. Despite this road map, the industry still faces several challenges, including better scoping of coverage; a more scientific process for formulating premium prices; a much improved legal framework, including a clearer understanding of liabilities and compensation; strengthened government support; and improved general awareness for companies and households of environmental risk.

9.2 The case of insurance risk-transfer and climate-related investments in developing countries

9.2.1 Introductory observations

Triggered by a wide scientific consensus about the seriousness of the problem, there is growing international agreement on the need to take action now to avoid future catastrophic climatic changes. But decision-making on climate change activities is complicated by a prevailing level of uncertainty about the exact nature of climatic changes and the costs and benefits of the action required now and in the future. The risks and uncertainties arise directly from the physical impacts of climatic changes such as extreme weather events, natural disasters or slow-onset developments such as sea-level rise, but also indirectly from the political responses to these challenges. Mitigation targets, climate policies and promotion of low-carbon technologies are all subject to political negotiations and their implementation could be adjusted, cancelled or delayed depending on political decisions. For those who provide insurance-risk transfer this creates new risks, but also opportunities. Often triggered by large-scale losses from extreme weather events, some private insurance companies have explored the issue of climate change by collaborating with scientists, publicly engaging in policy debates and also assessing the climate impacts on and opportunities for their own products.[27]

[27] Individual companies and sector initiatives such as ClimateWise and UNEPFI's Insurance Working Group, as well as industry organisations such as the Chartered Insurance Institute, the Geneva Association and national trade bodies have started publicly to address this issue through statements, research and events.

As insurance is still in its infancy in the developing world, not much attention has been given to the role of risk transfer in supporting climate activities in those countries. But in the wake of international climate negotiations the issue of climate change in developing countries is now receiving more attention amongst those who provide insurance. For example, signatories to the ClimateWise industry initiative have pledged to 'consider how we can use our expertise to assist the developing world to understand and respond to climate change',[28] while other groups such as the Munich Climate Insurance Initiative (MCII)[29] work with the UN on proposals for climate insurance schemes in developing countries. The discussion about insurance as a tool to foster investment in climate activities in developing countries can be applied to both the adaptation and mitigation sides of climate change policies.

Adaptation to climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as 'adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities'.[30] It captures a range of efforts to manage the effects of climate change, such as building flood defences, developing water irrigation systems or educating people about coping with heat. In the past often regarded as the poor relative of climate mitigation, adaptation is now an accepted part of climate policy. Even if all proposed mitigation measures were to be successful and global emissions levels could be reduced, there would still be a need to adapt to those climatic changes induced by historic emissions. Adaptation comes in different forms and includes both soft (e.g., education) and hard measures (e.g., strengthening of buildings to withstand wind storms). Adaptation is of great importance to developing countries, which are often highly vulnerable to climate change. The international community has recognised this challenge. Following the 2010 Cancún climate negotiations, the UNFCCC is now exploring insurance solutions for most vulnerable countries as part of a 'loss and damage' work plan.[31] For insurers, the

[28] See ClimateWise – Principle No. 3 – Support Climate Awareness Amongst our Customers, available at www.climatewise.org.uk (accessed 11 March 2012).

[29] See www.climate-insurance.org (accessed 11 March 2012).

[30] Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2007: Impacts, Assessment and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report* (2007), technical summary.

[31] The plan appears in Decision -/CP.16, Outcome of the Work of the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention, UNFCCC/AWGLCA/2010/L.7, paras 25–9, available at http://unfccc.int (accessed 11 March 2012).

concept of adaptation shows many similarities to the general principle of risk management: taking action to increase resilience and to reduce current and future risks. One could consider insurance itself as a form of adaptation, as it increases the financial resilience of policyholders, for example, through flood insurance. While some risks arising from climate change can be reduced through better preparedness, there will always be residual risks that can leave those exposed with significant financial gaps and increase poverty. One could also argue that adaptation is a way of maintaining the insurability of these risks, especially in the context of extreme weather events, and that effective adaptation may actually become a condition for granting insurance cover in the future, with insurance picking up the residual risks and extremes. A key question in this context is if and how insurance products could be designed in such a way that they trigger adaptive behaviour.

The IPCC defines climate mitigation as: 'implementing policies to reduce greenhouse gas emissions and enhance sinks'.[32] In the discussion about mitigation policies there is a growing focus on how financial instruments can help fostering low-carbon growth in developing countries through channelling investment flows into low-carbon technologies. The Copenhagen Accord[33] signified that deep cuts in global greenhouse gas emissions were required in order to hold the increase in global temperatures to below 2 degrees Celsius. This target was subsequently confirmed by the Cancún Agreements[34] and is expected to play a guiding role in the negotiations triggered by the Durban Platform.[35] Achieving these emissions reductions requires a shift to a low-carbon economy or, as noted by Nicholas Stern, 'a new industrial low-carbon revolution'.[36] The World Bank estimates that an amount of

[32] IPCC, *Climate Change 2007: Mitigation of Climate Change. Contribution of Working Group III to the Fourth Assessment Report* (2007), technical summary.

[33] Decision 2/CP.15, Annex (Copenhagen Accord), FCCC/CP/2009/11/Add. 1, para. 2.

[34] Decision 1/CP.16, The Cancun Agreements: Outcome of the Work of the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention, 15 March 2011, FCCC/CP/2010/7/Add. 1, para. 138–40.

[35] Draft Decision -/CP.17, Establishment of an Ad Hoc Working Group on the Durban Platform for Enhanced Action, preamble.

[36] See 'Lord Stern: Avoid Dangerous Warming with "Industrial Low-Carbon Revolution"', 21 March 2011, available at www.climateactionprogramme.org (accessed 11 March 2012).

US$240–600 billion a year is required by developing countries for building low-carbon infrastructures.[37] Due to the magnitude of the funds needed it is clear that, alongside traditional public development funding, private investment will have to provide a large part of the funds required, mainly in the form of foreign investments in areas such as renewable energy, reforestation or low-carbon technology transfer. Therefore a lot of emphasis is currently placed on creating the right environment and conditions to facilitate private and public investment flows.[38]

At a 2010 roundtable discussion hosted by rating agency Standard & Poor's and specialist firm Parhelion, representatives from the capital markets concluded that climate change-related investments 'are fraught with risks'.[39] Participants listed twenty-eight specific risks they face when providing climate change finance, ranging from technology risk ('technology is not efficient and/or too complex and/or not publically accepted')[40] to human/operational risks ('lack of well-trained workforce to implement projects').[41] Against this backdrop the chapter now explores evidence of insurance risk transfer related to climate activities in developing countries, based on four risk-transfer categories: liability; project insurance; natural disaster cover; and policy risks.

9.2.2 *Liability insurance*

Environmental-liability or pollution insurance is available in most developed insurance markets.[42] Historically, environmental damage was usually covered under general-liability policies. In the 1990s, in the

[37] K. Neuhoff, S. Fankhauser, E. Guerin et al., 'Structuring International Financial Support to Support Domestic Climate Change Mitigation in Developing Countries', *Climate Strategies 2009*, 5, available at www.climatestrategies.org (accessed 1 March 2011).

[38] See *ibid.*, 14–22; UNEP, *Catalysing Low-Carbon Growth in Developing Economies: Public Finance Mechanisms to Scale Up Private Sector Investment in Climate Solutions*. Case Study Analysis (2009), available at www.unepfi.org (accessed 15 February 2012).

[39] Standard & Poor's/Parhelion, *Can Capital Markets Bridge the Climate Change Financing Gap?*, Report 2010, 2, available at www.parhelion.co.uk (accessed 16 February 2012).

[40] *Ibid.*, 4. [41] *Ibid.*, 3.

[42] For an overview of the insurance market, see European Commission, *Financial Security in Environmental Liability Directive*, Final Report (August 2008), available at http://ec.europa.eu (accessed 20 February 2012).

wake of growing environmental damage awards through the courts, the insurance industry started to move to the development of specific environmental-liability risk cover. As far as compensation is concerned, environmental-liability insurance cover offers *ex ante* protection rather than relying on *ex post* penalties and fines, which can be uncertain if a polluter faces insolvency after an event. Compliance with current environmental laws and regulations is a standard condition for this type of insurance. But expecting insurers to play a quasi regulatory role in environmental protection through their risk selection process may be overstretching the capacity of private insurers. The provision of cover can provide an additional incentive for a company taking out insurance to comply with regulatory requirements and improve its own environmental standards. But monitoring compliance requires additional tools and expertise and the private sector usually relies on public regulators to take this role rather than doing it themselves. Some commentators identify insurance as a 'surrogate regulatory tool', arguing that through their own risk assessment and the underwriting decisions insurers can drive the behaviour of the insured.[43] There is some empirical evidence suggesting that insurers may effectively exercise a quasi-regulatory capacity for potentially hazardous or polluting operations.[44] According to this literature, the main driver for deterrence is the risk of not gaining insurance cover if certain standards are not met. In general terms, insurance can trigger risk-reduction activities if it is beneficial for both the insured and the insurer. In the context of environmental-liability insurance, the link between risk reduction and provision of cover is evident: the adherence to high standards, such as a company's environmental management system, can be a condition for the provision of insurance, or it may justify a lower premium compared to those risks where lower (or no) pollution standards are implemented. For insurers this is a direct way to reduce and control insured losses during the lifespan of an insurance policy (usually a year).

To what extent is the provision of compensation to victims and reducing pollution by incentivising risk reduction relevant for climate change activities in developing countries? The consideration of

[43] OECD, *Environmental Risks and Insurance*, 53.

[44] See Yin, Pfaff and Kunreuther, 'Can Environmental Insurance Succeed'; B. J. Richardson, 'Enlisting Institutional Investors in Environmental Regulation: Some Comparative and Theoretical Perspectives' (2002) 8 *North Carolina Journal of International Law and Commercial Regulation* 247.

greenhouse gas emissions as pollution and the consequential award of damages from losses linked to the emissions is subject to legal discussions. Especially in the USA, several cases are currently being tested in the courts to see if a carbon liability exists.[45] The key difficulty is the establishment of a causal link between emitting activities and damages. This is referred to in climate change circles under the heading 'attribution': is it possible to determine how much of severe weather losses can actually be linked to climate change? If the courts were to conclude that carbon liability exists then one could envisage that liability insurers would incentivise policyholders to reduce their emissions activities and/or to incentivise adaptation activities. Yet, in practice, in such a scenario it is likely that most insurers would apply a cover exclusion for carbon liability.

9.2.3 Project insurance

9.2.3.1 Common project risks

There is evidence that risk transfer can facilitate climate investment and support the development of 'clean' technologies by removing some of the 'project risks' faced by investors. Common project risks such as construction risks, property damage, political risk and liability can usually be covered by traditional insurance in the same way as other large-scale international investment projects. A wide range of private insurers offer risk transfer of these mainly operational risks from project phase to completion. Challenges, such as lack of loss data for new technologies or unclear legal frameworks for liability, exist, but they can be overcome. This point can be illustrated by reference to three examples, as follows.

In April 2012, Aviva, a major UK insurance company, unveiled a range of new policies and services that cover operational risks for onshore wind, solar, waste-to-energy, biomass power, environmental consultancy and building technology firms. The firm offers public liability cover worth up to £1m and will also cover the failure to supply power to the electricity grid from a renewable energy project.

[45] For example, on 17 January 2012, the Supreme Court of Virginia set aside its groundbreaking judgment in *AES Corporation* v. *Steadfast Insurance Company*, 282 Va. 252 (2011), which held that the emission of carbon dioxide was not an 'occurrence' within the meaning of a general liability policy. See 'Virginia Court Grants Rehearing of Global Warming Claims Case', *Insurance Journal* (3 February 2012), available at www.insurancejournal.com (accessed 18 March 2011).

AIG provided one of the first ever insurance coverage for a carbon credit transaction back in 2007. The firm provided a letter of assurance to Chinese factories covering the commitment from a Japanese firm to honour the purchase of carbon credits generated under the Clean Development Mechanism.

The Overseas Private Investment Corporation (OPIC) recently provided one of the first political insurance contracts for a reducing emissions from deforestation and forest degradation (REDD) project. OPIC provided US$900,000 in political insurance to Terra Global Capital, an investor in the project. The specific REDD scheme aims to protect 64,318 hectares of forest in Cambodia and sequester approximately 8.7 million metric tons of CO_2.

Creating adaptation infrastructure and wider adaptive capacity in developing countries also requires significant funds and expertise. The private sector will have to play a role in providing these funds in the same way as in the mitigation projects outlined above. The adaptation investment projects, such as flood protection infrastructure or drought management solutions, require similar risk transfer during the project phase. This area has received scant attention and will require further elaboration, specifically in discussions on how to secure private-sector adaptation funding and where to spend the capital required for adaptation.[46]

9.2.3.2 Carbon-finance-specific risks

In addition to the above risks, low-carbon investments also face carbon-finance-specific risks. Since the establishment of international carbon-finance markets as part of the Kyoto Protocol,[47] insurance has been available to assist investors and transfer some of the risks, mainly in the context of the joint implementation (JI) and the clean development mechanisms (CDM), by combining traditional project insurance with cover for emissions credits, such as credit delivery guarantees. The cover is against lack of or under-performance of climate investment in terms of the underlying emissions reduction. An example would be an industrial facility funded through a CDM investment, which then fails to deliver the expected emissions reduction.

[46] For more information, see A. Persson et al., 'Adaptation Finance Under a Copenhagen Agreed Outcome' (2009), Research Report, SEI, Stockholm, available at www.sei-international.org (accessed 14 March 2012).

[47] Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto, 11 December 1997, 2303 UNTS 148.

These risk-transfer solutions are offered by the private insurance market, but often in close cooperation with international organisations. They are in direct response to the specific needs of climate investments. An example is Swiss Re's cover for CDM projects, developed in 2006,[48] or Munich Re's 'Kyoto Multi Risk Policy', developed for international carbon markets.[49] The growth in carbon markets has also led to the establishment of specialty insurance service providers such as Carbon Re and Parhelion, who offer assistance with risk solutions in carbon finance. Carbon Re, supported by the global environment facility (GEF) and the United Nations Environment Programme (UNEP) has developed an insurance product for renewable energy projects in developing countries. Besides the traditional insurance products for construction, operation and transit for renewable energy projects, the service offers bespoke covers such as carbon-counterparty credit risk insurance, carbon all-risk insurance and carbon delivery guarantee insurance/Kyoto multi-risk policy. But despite these developments it is difficult to assess the size of the transactions and the volume of supply and demand for these specific products, particularly with regards to projects based in developing countries.

9.2.3.3 Political risk

Investments in foreign countries face political risks. In the insurance industry, the term 'political risk' covers areas such as currency convertibility and transfer, expropriation, political violence, breach of contract by a host government and the non-honouring of sovereign financial obligations.[50] In the wake of globalisation and the growth of international trade, governments in the developed world have concluded that one way

[48] A brief characterisation of this instrument appears on the website of Swiss Re: 'The insurance product, which was developed by Swiss Re and RNK, covers Kyoto-related risk to carbon credit purchases by RNK. The policy, issued by Swiss Re subsidiary European International Reinsurance Ltd, provides coverage for the risks related to Clean Development Mechanism (CDM) project registration and the issuance of certified emissions reduction credits (CERs) under the Kyoto Protocol's CDM. These risks include the failure or delay in the approval, certification and/or issuance of CERs from CDM projects by United Nation Framework Convention on Climate Change (UNFCCC)', RNK Capital and Swiss Re Structure First Insurance Product for CDM Carbon Credit Transactions, available at www.swissre.com (accessed 11 March 2012).

[49] Munich Re, *Topics Geo: Natural Catastrophes 2006: Analyses, Assessments, Positions*, 2007, available at http://extremeweatherheroes.org (accessed 14 March 2012).

[50] Multilateral Investment Guarantee Agency (MIGA), *World Investment and Political Risk, 2009*, 28.

of encouraging further trade and investment by companies is the provision of political risk insurance, believing that this would provide positive externalities for the wider economy. Political risk cover is now available through (inter-)governmental agencies, for example, the World Bank Multilateral Investment Guarantee Agency (MIGA), and also some private insurers, such as Lloyd's of London, Atradius or Hiscox. The products offered by these public and private institutions can also be applied to climate-related investments in developing countries, as the political risks facing these investments are not different from those experienced in other sectors and in international trade.

An illustration of the importance of political risk for low-carbon investments is provided by the Desertec Industrial Initiative, launched in 2009 by a large group of leading companies from different sectors, including Munich Re. The project seeks to foster investment in the utilisation of renewable energy in North Africa. In light of current political changes in the North Africa and Middle East region the political risk of this project has received increased attention. Political risk insurance is a specialist area and some limitations on the type of risk and locations apply. Significantly, political risk insurance not always covers (or covers inadequately) regulatory risks, although these latter are increasingly viewed by investors as a major source of risk.[51]

But one can expect that extensions of existing political risk-transfer products will seek to provide coverage to climate-related projects. Such extensions could be operated either publicly – through government or governmental agencies – or privately. Similarly, they could be pursued either on a bilateral or on a multilateral basis. This could provide support to investors and reduce some of the investment risks in the transition to a low-carbon economy. Mills[52] outlines a range of insurance products pertaining to political and regulatory stability risk that could be relevant in this connection: companies providing political risk insurance include ACE and Zurich for carbon-emissions trading and carbon-credit projects. Munich Re includes political risk in its Kyoto policy and Carbon Re additionally offers political risk products as well as products covering other risks associated with carbon-reduction projects.

[51] MIGA, *World Investment and Political Risk, 2011*, 46.
[52] See Mills, *From Risk to Opportunity*, 40.

9.2.4 *Natural disaster cover*

Developing countries are at risk from changes in extreme events, owing to a combination of factors such as geography (with many being located in already hot tropical and sub-tropical regions), sensitivity of the economies to weather (because of the relative dominance of agriculture) and lack of resources to prepare for disasters or increase resilience levels.[53] The application of risk transfer to manage the impacts of natural disasters is relatively well researched, but unevenly applied across the world, with the extent and scope of risk transfer varying from country to country.[54] Over the last decade, more risk-transfer schemes have been developed in poor countries, often run as pilot projects between the private sector and public authorities. The recently published *Compendium of Disaster Risk Transfer Initiatives in the Developing World*[55] offers a snapshot of current risk-transfer activities in low- and middle-income countries.

The *Compendium* documents 123 existing initiatives in middle-income and lower-income countries that involve the transfer of financial risk associated with the occurrence of natural hazards. There appears to be potential in many places and a growing recognition of the possible roles for risk transfer in fostering risk-reduction activities. Closer examination shows that the schemes are truly diverse, often created to meet very specific needs in a particular community, with a wide range of stakeholders being involved, and differing levels of risk transfer being provided. The cover is provided via private insurers, governments or public–private partnerships. While agricultural insurance is the most common form in all countries, a particular geographical preference for other types of insurance is noticeable, such as micro-insurance against natural disasters in Asia. This may reflect local tradition and possibly also cultural differences, while other factors, such as links to micro-finance schemes, may also have an influence.[56]

[53] A. Millner and S. Dietz, 'Adaptation to Climate Change and Economic Growth in Developing Countries', Grantham Research Institute on Climate Change and the Environment Working Paper 60 (2011), 2, available at www2.lse.ac.uk (accessed 24 February 2012).

[54] CEA, *European Insurance – Key Facts*, 4.

[55] ClimateWise, *Compendium of Disaster Risk Transfer Initiatives in the Developing World*, available at www.climatewise.org.uk (accessed 20 February 2012).

[56] S. Surminski and D. Oramas-Dorta, 'Building Effective and Sustainable Risk Transfer Initiatives in Low- and Middle-Income Economies: What Can We Learn from Existing Insurance Schemes?', Policy paper, Centre for Climate Change Economics and Policy/

The main aim of these schemes is compensation after a loss. But depending on design and operation of the risk transfer this can also lead to risk reduction and greater resilience. As experience with flood and windstorm insurance in developed countries shows, there are some key principles that should be met when designing and regulating insurance schemes to make full use of their risk-reduction role: (i) risk levels should drive the pricing of insurance cover (risk-based pricing rather than cross-subsidisation); (ii) granting of cover must require certain measures of risk reduction to be in place (such as business continuity plans or strengthened roofs in exposed coastal areas); (iii) insurance payouts after a loss must increase resilience (for example, through resilient repair after a flood). Surminski and Oramas-Dorta show that the full potential for utilising risk transfer for adaptation is far from exhausted.[57] Only very few schemes have a direct operational link between risk transfer and risk reduction. Not surprisingly, the large majority of risk-transfer schemes focus on today's weather risks and do not capture climate change in vulnerable low-income countries. The Cancún Adaptation Framework, an outcome of the 16th Session of the Conference of Parties to the UNFCCC, highlights the need to strengthen international cooperation and expertise to understand and reduce loss and damage associated with the adverse effects of climate change. In this context, a new work programme on 'Loss and Damage' has been initiated in order to assess the potential of a wide range of adaptation and risk-management measures. One particular focus of this work stream is the proposal to create a climate insurance facility to provide cover against extreme weather events.[58]

9.2.5 Policy risks

Another challenge for investors in climate projects is the risk that underlying policy frameworks and subsidy schemes may change during the lifetime of their investment. Changing political landscapes can make an investment unprofitable, which is often highlighted by investors as a

Grantham Research Institute on Climate Change and the Environment (2011), 23, available at www.cccep.ac.uk (accessed 27 February 2012).

[57] *Ibid*., 24.

[58] See http://unfccc.int/adaptation/cancun_adaptation_framework/loss_and_damage/items/6056.php (accessed 14 March 2012).

key barrier for climate investment flows into developing countries.[59] This policy risk is relevant not just in a developing country context, but also in established markets, where changes to climate policy may affect the validity of investments.

If we look first at mitigation efforts, low-carbon sectors such as renewable energy have been and continue to be hugely dependent on public policy, not just in terms of the usual subsidies and technology push measures, but also in terms of political decisions on emissions reduction and the structure of international carbon finance. This creates a degree of political dependence and uncertainty in terms of sudden policy changes, which may make investments unprofitable. This is often quoted as one of the key barriers to climate-related investment. The potential for transferring these risks has not been investigated in great detail, but an initial assessment by stakeholders such as the Climate Bonds initiative suggests that these type of risks might only be insurable through public schemes. Yet, there appears to be a possibility for some private insurance cover related to some retrospective changes to law and regulation, as illustrated by a recent insurance transaction developed by Lloyds Syndicate Kiln and specialists firm Parhelion. This collaborative offering provides an insurance product designed to compensate policyholders against changes in legislation in the European Union that could impact suddenly on the value of carbon credits or certified emissions reduction (CER) credits. The product is designed to create more certainty and stability for financial institutions trading carbon credits in Europe.

This is a very new area for insurers and it is too early to say if there will be a broader private market for these types of products or whether this will be a task for public institutions, possibly as an extension of the existing political risk schemes. This issue is also very relevant in the developed world context, where some recent policy changes have had significant implications for investors. Judicial proceedings triggered by these changes, which might possibly lead to compensation payments by governments, are still ongoing with an unclear outcome, as evidenced in the UK's legal dispute about the government's revision of renewable feed-in tariffs.[60]

[59] Standard & Poor's/Parhelion, *Can Capital Markets Bridge the Climate Change Financing Gap?*, Report 2010, 3.

[60] See Department for Energy and Climate Change, Application to the Supreme Court, 21 February 2012, available at www.decc.gov.uk/en/content/cms/news/fits_supcourt/fits_supcourt.aspx (accessed 15 March 2012).

With respect to adaptation, creating the necessary infrastructure and wider adaptive capacity in developing countries requires significant funds and also expertise. These adaptation investments, such as flood protection infrastructure or draught management solutions, face also policy risks. Yet, this area has been explored even less than mitigation investments, although it is likely to gain more prominence in the context of discussions about adaptation finance. When it comes to policy risks, in particular, the application of traditional risk transfer may prove difficult or impossible for private insurers owing to the nature of the risk and the high legal and political uncertainty attached to it. Thus, any solutions may have to involve the state. State involvement would be justified by a market failure (if no private cover can be offered) and/or by the overall political and economic rationale for supporting climate investments in developing countries.

While there are significant limits to insurability, a pragmatic view would suggest that market demand will eventually trigger supply. Strong regulatory systems and institutions will be key enabling factors for this type of policy.[61] But further research and market assessments are still needed to investigate the potential for this risk transfer.

CONCLUSION

Insurance risk transfer has for centuries been part of economic activity and provided financial resilience for individuals, companies and governments in the face of uncertain losses. This article has explored if and how this mechanism can be applied to harness investment in environmental protection in developing countries by investigating the case of climate change. Any investment faces risks. Underwriting some of these in exchange for a premium payment can reduce investors' uncertainty and make some investments more attractive.

The above analysis identified three potential roles for insurance risk transfer in the context of environmental protection: compensation for victims and funding of clean-up processes; incentivising risk-reduction efforts; and fostering environmental investments by transferring some of the investment risks. The compensation element is still of limited relevance in the climate change context, because the legal interpretation of liability for damages arising from greenhouse gas emissions is not clear

[61] J. Brown and M. Jacobs, 'Leveraging Private Investment: The Role of Public Sector Climate Finance', *ODI Background Notes* (April 2011), 3, available at www.odi.org.uk (accessed 5 March 2012).

yet. As seen in pilot projects in a range of developing countries, there is scope for insurance schemes to incentivise risk reduction and adaptation as well as regulatory compliance. But the effectiveness of this process depends on the design of the insurance products, an area which is currently investigated both by the insurance industry and by policy-makers. In the context of climate change investments there is evidence that the transfer of investment risks could provide a boost for private climate funding. While insurance solutions already exist for most of the common project risks and political risks attached to mitigation and adaptation investments, there are a range of specific risks for which no cover has been developed and where only public insurance schemes or public–private partnerships may be able to offer risk transfer. The existing political commitment to increased investment in climate change action could justify public support for risk-transfer solutions that reduce the investment risks as a way to reduce the barriers to private investment in climate action.

In addition to these three roles, there may be other reasons for insurers to promote mitigation through their products: they may see it as good citizenship under their wider corporate sustainability agenda; they may use climate-mitigation activities to create a positive image amongst stakeholders; or they may use certain green policies to target 'responsible' customers who are perceived to be less likely to experience losses than less environmentally conscious individuals or companies. Some insurers have developed specific policies, which seem to reward environmentally friendly behaviour. Some motor insurance policies charge less premium if a car is driven less, on the basis that this also reflects on the risk of accidents. The fact that this will also reduce the car emissions is a side effect, but not the main driving force for the insurer.

The application of insurance risk transfer in the context of climate-change investments is a relatively new area and an overall assessment of the effectiveness and efficiency of the solutions offered has not been conducted yet. There is growing knowledge about barriers and constraints and both industry and decision makers are exploring ways to improve and enhance the environmental role of risk transfer. This provides an opportunity for developing countries to avoid repeating past mistakes in the developed world and for the industry to become more innovative in linking the environmental role to other insurance functions. This could lead to sustainable insurance solutions that support environmental protection, but it will not replace the need for environmental regulation.

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